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Office of Personnel Management

# Computer Specialist Series

GS-334

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## **NOTE**

This standard has been converted from the original paper format to electronic format without substantive change in series coverage or grading criteria. The standard was reviewed to correct errors that may have been introduced during the conversion process. In some standards minor corrections were made such as updating references to other documents that may have become obsolete, or correcting minor typographical errors in the original standard. Any errors that remain due to conversion to electronic format should be minor and are not intended to change the meaning of the original standard.

If you find page references near the right hand margin of this standard they indicate the pagination of the official, printed version of this standard. For example, a notation "PAGE 2, 4/88, TS-87" would mean that (1) page two of the printed version begins here, (2) the date of issuance was 4/88, and (3) the Transmittal Sheet number was TS-87.



# **Computer Specialist Series**

**GS-334**

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The work in this series includes responsibility for analyzing, managing, supervising, or performing work necessary to plan, design, develop, acquire, document, test, implement, integrate, maintain, or modify systems for solving problems or accomplishing work processes by using computers. Positions are included in this series when the primary need is knowledge of information processing methodology/ technology, computer capabilities, and processing techniques.

This standard cancels and supersedes the standard for the Computer Specialist Series, GS-334, issued in December 1980 (TS-51).

## **EXCLUSIONS**

The following types of positions are excluded from this series:

1. Classify positions to the appropriate subject-matter series when they involve computer work primarily requiring knowledge of a specific subject-matter field as the paramount consideration for recruitment. This includes positions involved in developing computer programs not part of an integrated system, i.e., that do not require analysis to discern the effect of a change in one of the programs on related or subsequent programs. It also includes subject-matter specialists involved in defining functional requirements and analyzing existing computer systems to assess their ability to meet requirements.

2. Classify positions which require full professional qualifications in mathematics, engineering, physics, or related field in the series appropriate for the engineering or scientific discipline involved.

3. Classify positions in the Management and Program Analysis Series, GS-343, when the primary concern is with the evaluation of the effectiveness of Government programs and operations, or the productivity and efficiency of the management of Federal agencies or both.

4. Classify professional research positions in the Computer Science Series, GS-1550, or the Computer Engineering Series, GS-854, when they require the application of theoretical computer science, or engineering specialized knowledge of the characteristics and potentials of computer systems architecture, and knowledge of relevant mathematical and statistical sciences.

5. Classify positions in the Computer Operation Series, GS-332, when they primarily involve control of program, job, and data flow through operation of computer consoles.

6. Classify positions in the Computer Clerk and Assistant Series, GS-335, when they involve one or more computer support functions or similar duties where the work does not require indepth knowledge of computer requirements or techniques associated with development and design of computer systems.
7. Classify positions in the Telecommunications Series, GS-391, when they require technical knowledge of telecommunications requirements, processes, and techniques where this does not involve, as a paramount requirement, knowledge of planning or programming the automation of work processes through the use of digital computers.
8. Classify positions in the Office Automation Series, GS-326, when the primary purpose is to provide general office clerical support involving duties requiring specialized knowledge of general office automation hardware and software systems, practices, and procedures.

## OCCUPATIONAL INFORMATION

The primary focus of positions in the Computer Specialist Series is helping others (i.e., the users of ADP technology) accomplish their work. This requires (1) knowledge of how digital computers process data, and (2) knowledge of how to evaluate and organize work processes and problems for computer solution. Basic knowledge addressed by the positions in this series may relate to a broad range of applications which support various "communities." These include data processing for business and scientific applications which typically use commercial general purpose computers in a wide variety of sizes and configurations, including stand alone and networked personal computers. Also included are tactical and weapons systems applications which typically use general or special purpose computers adapted for military applications. Although employees often gain much insight into the flow and products of a subject matter operation, their expertise is in enhancing the effectiveness and efficiency of those work processes, not in performing them.

Positions in this series involve analytical and evaluative work concerned with integrated systems of computer programs and/or computer equipment. Assignments involve applying available technologies and basic management principles to adapt computer methods to a variety of subject-matter situations.

Many computer specialists are involved in supporting subject-matter users by developing or designing applications for computers and in selecting, or assisting in selecting, computer equipment. The following is a representative sequence of stages in the development of computer applications. Individual computer specialists may specialize in one or several

stages of automating a work process, or may function as part of a generalist team and be involved in all 19 stages depending on the nature of the assignment.

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1. Defining a need for accomplishing a work process by computer.
  2. Factfinding in the user area (i.e., the user is the organization doing the subject-matter work, such as a payroll unit).
  3. Analyzing the findings.
  4. Determining whether an automation need actually exists. (A non ADP approach may be the best solution.)
  5. Establishing system requirements in terms of objectives, functions to be served, and expectations of management.
  6. Analyzing existing computer applications, if any.
  7. Analyzing computer equipment and system software needs and availability.
  8. Preparing recommendations to include costs and benefits of alternative approaches.
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9. Deciding to automate.
  10. Analyzing existing automated and manual systems in depth to determine what can be used or changed.
  11. Preparing programming specifications, including inputs, outputs, flow diagrams, decision logic tables, and linkages with other application systems.
  12. Developing program and module designs and reviewing available programs/software.
  13. Developing block diagrams and program coding.
  14. Testing and validating programs.
  15. Testing and validating systems.
  16. Documenting the system.
  17. User acceptance.

18. Installation.

19. Post-installation evaluation.

When new equipment is acquired or computer equipment is moved, some computer specialists become involved in site preparation (flooring, cooling, wiring, etc.), performing or overseeing equipment installation or relocation, testing, and acceptance processes.

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The ultimate objective of data processing support is to provide users with the ability to accomplish work by using computers. Not all of the work, however, is involved in developing computer applications software. Employees in this occupation may specialize in one or more functions such as the following:

(1) identifying the nature and scope of subject-matter processes to be automated, and organizing such work processes into data systems for subsequent processing by computers;

(2) selecting or designating specific kinds of computers and related peripheral devices to be used;

(3) organizing plans and programs which specify the nature and sequence of actions to be accomplished by the computer itself;

(4) performing specialized activities associated with developing, designing, installing, and maintaining data processing systems;

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(5) developing designs and plans for integrating computer hardware and software for a networking system;

(6) standardizing data elements and daily operating procedures;

(7) evaluating computer requirements to assure that systems are properly integrated and resources effectively used;

(8) evaluating or designing, installing, and monitoring computer security systems;

(9) evaluating or designing, installing, monitoring, and modifying data base management systems;

(10) developing specifications for acquiring computer hardware and services;



(11) reviewing contract proposals for adequacy in terms of vendor ability to perform desired actions and produce proper results; and

(12) serving as Contracting Officer's Representatives in monitoring vendor/contractor performance.

Many positions are difficult to evaluate because of the project nature of the work. The automation process frequently is carried out by teams made up of subject-matter specialists, line managers, management analysts, specialized or generalist computer employees, and others in varying numbers and combinations. The duties and responsibilities assigned to a particular position typically change between stages of a project and from one project to the next. Therefore, in evaluating positions, the focus should be on the most representative level of work performed.

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Careful attention should be given to the evaluation of positions concerned primarily with maintaining and modifying existing systems. Depending on the situation, such work may be equal in difficulty to, or more or less difficult than, developing the original system. For example, an existing system may place more constraints on the creativity of the employee or a change in guidelines may force a reworking of techniques. Complexity may increase as the system matures or it may decrease as refinements are made. Personal contacts with users may decline or they may become broader, particularly if the technology is transferred to other users.

Knowledge of automatic data processing is becoming an increasingly important part of many occupational fields. In most instances, however, the knowledge, skills, abilities, and techniques associated with the subject-matter or support field remain primary. The computer is a tool to facilitate the accomplishment of work in the subject-matter specialty. In deciding whether a position is properly classified in the Computer Specialist series, the paramount considerations are the primary purpose of the position and the employee involvement on a regular basis in the processes and functions of automation.

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A number of elements that characterize various work situations in the occupation are not individually related to any specific level of difficulty. They include --

- the operating mode (real time, time sharing, batch, remote batch, etc.);
- generation, brand, size, or model type of computer and peripheral equipment;
- nature of the work process automated (whether clerical, statistical, scientific, etc.);
- data base size;

-- amount of mathematics required (the position is excluded from the Computer Specialist Series if the duties require full professional qualifications in mathematics); or

-- variety of programming languages or applications software used.

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These elements are considered in the factor level descriptions in this standard in combination with other work characteristics which, collectively, impact on the factor and grade levels.

End user automation is a particularly good example of how computer specialists and subject-matter personnel work together.

Subject matter personnel --

-- define the processes to be automated;

-- review applications software; and

-- operate systems.

The computer specialist --

-- helps to define processing requirements;

-- advises on the selection of hardware and software;

-- advises on (or designs and develops) software selections;

-- develops individual or distributed data base systems;

-- designs networks and prepares operating specifications;

-- selects modems and operating protocols;

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-- coordinates with others, such as telecommunications specialists; and

-- trains end user staff to perform work using computers.

The end result is a stand-alone or networked computer system that meets the needs of the subject-matter programs.

Some systems are a mix of vendor supplied and agency created programs and data bases that can vary from site to site. Computer specialists respond to and resolve problems with software, hardware, and systems management. They may also integrate several hardware, software, and/or computer related services to provide an integrated information system for subject-matter specialists. Computer specialists are often involved in evaluating vendor or Government employee developed software to assure that it will provide the desired results and work properly on the assigned equipment systems.

## **GLOSSARY OF TERMS**

The following is a list of terminology used in this standard. It is not intended to be comprehensive or represent the often changing terminology or jargon used by employees in the occupation. More comprehensive definitions of technical terms are available in the American National Dictionary for Information Processing Systems (Publication 11-2 or 11-3), available from the National Technical Information Service, Springfield, Virginia 22261. Another source is the Glossary of Telecommunications Terminology, Federal Standards #10-37, available from the General Services Administration, GSA Specifications Sales, NCR, Washington, DC 20407.

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**APPLICATION** - The subject-matter process or problem to which the computer technology is applied (e.g., a payroll system, a word processing system, a supply system).

**CODING** - Expressing the solution to the problem in a computer language.

**DATA BASE ADMINISTRATION/MANAGEMENT** - Developing, selecting, and/or maintaining computer data bases to obtain greater efficiency in computer memory and processes; determining the way in which data is organized in the data base and assigning names and definitions to the various records and fields; and overseeing the security system and controlling all information placed in or deleted from the data base.

**DATA BASE MANAGEMENT SYSTEM (DBMS)** - A software system for storing, revising, and retrieving data shared by a number of users.

**END USER** - Normally refers to a user/operator in a subject-matter environment using stand-alone or networked personal computers and software tailored for the subject-matter processes.

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**LOCAL AREA NETWORK (LAN)** - Sharing data and resources among several small computers within a small geographic area such as an office or a building.

**NETWORK** - A complex consisting of two or more interconnected computers.

**OPERATING SYSTEM** - A set of programs that allows the computer system to manage its own resources.

**PERSONAL COMPUTER (PC)** - A relatively low cost, portable or semiportable microcomputer, generally sold with software packages.

**SOFTWARE** - Computer programs, procedures, rules, and associated documentation concerned with operation of a data processing system.

**STANDARDS** - Written instructions and directions for computer specialists to achieve uniformity in systems, coding, and related programming techniques and usages.

**SYSTEM** - (1) The total collection of interconnected and interrelated equipment and its processing capabilities available to perform data processing functions; (2) a collection of interrelated programs, typically using a common data base or interconnected data bases, to produce output for functional users; or (3) a collection of people, machines, and methods organized to accomplish a set of specific functions.

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**SYSTEMS SOFTWARE** - Computer programs, usually provided by the computer manufacturer, that are necessary to process applications programs and for the operation of the computer and its peripheral devices. Included, for example, are assemblers, compilers, operating systems, and utility routines.

**TELECOMMUNICATIONS** - As related to this occupation, data communication connections between computers, usually carried over telephone circuitry. Telecommunications systems typically include modems to interpret signals compatible with sending and receiving units, dial-up or on-line access to telephone channels, and protocol converters to assure the ability to interpret signals.

**USER FRIENDLY** - Computer system using software that is designed for ease of use by personnel untrained as computer specialists.

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**WIDE AREA NETWORK (WAN)** - Sharing data and resources among a number of small computers within a widely dispersed geographic area.

## **TITLES**

Computer Specialist is the title for all nonsupervisory positions in this series. (See the Introduction to the Position Classification Standards for guidance on using parenthetical titles to identify specialty areas and selective qualifications.)

Supervisory Computer Specialist is the title for all positions that meet the criteria in the appropriate guide for classifying positions as supervisors.

## **EVALUATING POSITIONS**

Positions should be evaluated on a factor-by-factor basis using the factor-level descriptions provided in this standard. Only the designated point values may be used. More complete information for evaluating positions are in the instructions for the Factor Evaluation System. Use the primary standard to evaluate positions, such as those at trainee and developmental levels, for which factor levels lower or higher than those described in this standard are applicable. The absence of an example or illustration in a given factor level description does not preclude evaluating a particular specialty at that level.

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Classify positions that meet the criteria for evaluation as supervisors by criteria in the appropriate evaluation guide for supervisory positions.

Positions primarily oriented toward education and training of other computer workers are to be evaluated by using the Grade-Evaluation Guide for Instructor and Specialist Positions.

## GRADE CONVERSION TABLE

Total points on all evaluation factors are converted to GS grades as follows:

GS Grade	Range
9	1855-2100
11	2355-2750
12	2755-3150
13	3155-3600
14	3605-4050
15	4055-up

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## FACTOR 1, KNOWLEDGE REQUIRED BY THE POSITION

### Level 1-6 -- 950 Points -

Employees at this level use knowledge of established techniques and requirements of the employing organization. These include, for example --

- data processing documentation procedures;
- standard data elements and codes;
- available utility routines;
- customary factfinding approaches;
- decision logic tables; and
- structured analysis and design methodologies.

The primary requirement at level 1-6 is for knowledge of how to execute assignments such as evaluating vendor developed software available over the counter for well defined subject-matter applications. Computer specialists at this level --

-- develop individual programs, test plans, or reports within an approved framework; or

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-- facilitate user interface and access to computer systems by giving training on using generalized software such as operating system interface commands, communications software, and application systems.

Participation in formulating overall plans, proposals, or design frameworks typically is limited to developing factual data such as staff hour estimates for programming a certain modification or whether one of the presently utilized brands of computer equipment averages more downtime than others.

An applications oriented assignment normally entails knowledge of the technical characteristics of an operating mode (e.g., time sharing, local or wide area network), an equipment configuration (e.g., remote job entry terminals, end user systems), and system software rules pertinent to the assigned area. This level also includes knowledge of the work process to be accomplished or equipment to be controlled by computer.

Such knowledge is used to carry out assignments where the objectives to be reached are clearly identified and are realizable by straightforward adaptation of precedents and established practices. The information provided typically specifies basic requirements. This includes, for an applications project, what the operating mode is to be, what kinds of equipment or system software will be required, which programming language is appropriate, and what inputs, outputs, and overall processing logic are involved.

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Illustrations: Computer specialists perform a variety of functions within and outside the data processing organization. For example, they --

-- maintain and modify, as necessary, an assigned group of programs within the total number of utility routines, execution routines, input- output control programs, etc., required to support an agency's telecommunications system. Detailed programming specifications are provided. The programming language and operating mode are predetermined.

-- evaluate various brands of computer equipment (e.g., a group of display terminals or disk units) for replacement of or addition to existing machinery. The decision has already been made as to number of units or capacity needed and with what other equipment the new equipment must be compatible.

-- develop detailed logic, test, debug, and program documentation for computer system applications where specifications set forth features such as interface requirements, the inputs, outputs, sequences, and the edit criteria. Agency policy requires that a particular programming language be used.

-- review software available from vendors to run on a personal computer network devoted to subject-matter processing, using an established data base and output requirements. Compatibility with existing networked hardware systems, languages used, and established network operating protocols must be accommodated. Computer specialists recommend software selection from among several options, considering operating characteristics, human-machine interface, and compatibility and interoperability with existing systems.

-- monitor subject-matter personal computer systems - perform minor adjustments and maintenance; provide user training; develop office applications through off-the-shelf software. They serve as a point of contact between the servicing ADP organization and the subject-matter organization and perform standardized disk recovery operations.

-- train users to use - generalized software, including operating system commands and procedures to communicate with system software and obtain system status information; system utilities to display or print files; software for ad hoc information retrieval and report generation; and communications hardware and software to access remote computer facilities. They develop user guides and handbooks on how to make effective use of application systems developed for their support.

### **Level 1-7 - 1250 Points -**

Employees at this level use, in addition to level 1-6, knowledge of a wide range of computer techniques, requirements, methods, sources, and procedures. They include, for example, familiarity with approaches used by ADP organizations in other agencies and/or the private sector. Computer specialists accomplish a variety of assignments in the assigned application area or specialty area.

Included at this level is knowledge of system software and systems development life cycles (including systems documentation, design development, configuration management, cost analysis, data administration, systems integration, and testing). This knowledge is used to track the use and status of resources for system design projects through development, modification, maintenance, and evaluation of a standard program management system.

Employees use skill in applying agency policies and data processing standards and knowledge of technical data to evaluate alternative approaches to problem solutions. They use knowledge and skill to modify and adapt precedent solutions to unique or specialized requirements. Skill in relating considerations or facets of the work to the overall project is entailed, such as in evaluating new system software to estimate conversion costs or required training.



This level requires the ability to --

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- modify standard practices and adapt computer systems to solve a variety of computer software problems;
- adapt precedents or make significant departures from previous approaches to similar projects in order to provide for the specialized requirements of some projects; and
- apply the standard practices of related scientific disciplines as they relate to the specialty area.

Such knowledge, skills, and abilities are used to analyze, evaluate, and make recommendations on major aspects of a project such as, what system interrelationships must be considered, what operating mode, system software, and/or equipment configuration is most appropriate. Characteristic of positions using level 1-7 knowledge is an employee performing studies in which alternatives are set forth or devised, their costs and benefits weighed (often on the basis of tests or calculations especially developed for use in the study), and reports prepared in which the study methodology is outlined, alternatives are discussed, and recommendations made.

Typically, employees at this level develop the plans or specifications necessary for carrying out the recommendations, e.g., for a proposed application, developing specifications which set forth inputs, outputs, the basic decision rules, and program interrelationships. Also included at this level are trouble-shooting design and software implementation problems. The specialist provides staff advisory, planning, user assistance/ training, or evaluating services or functions within a specialty area, e.g., computer performance measurement techniques or security procedures applicable to a particular system.

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This level of knowledge is used to perform work relating to --

- national standards which are often indefinite and/or incomplete;
- system performance and capacity management;
- local and wide area networking and system integration;
- procurement actions in terms of cost/benefit analysis, conformance to life-cycle management regulations, developing system, component, and software specifications, technical analysis of offers, implementation, and contract execution; and/or

-- maintaining existing systems, including troubleshooting, problem solving, upgrading and debugging.

Illustrations: At this level, computer specialists --

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-- perform studies and recommend a course of action on proposed projects such as whether it would be cost effective to modify a sizable automated record keeping system to produce various additional products and reports. They consider aspects such as --

- o success of various approaches in comparable projects at other activities;

- o impact on ADP staff resources;

- o advice of equipment analysts and systems programmers on topics affecting their specialties; and

- o possible conflicts or beneficial relationships with other systems.

They program, test, document, and implement the resulting modification.

-- develop procedures and techniques to carry out audits of a variety of operational ADP activities and advise auditors on appraisal approaches suitable for evaluating different kinds of Government and contractor ADP systems. They --

- o design audit routines to test data integrity and the reliability of information systems;

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- o evaluate adequacy of controls as reflected in policies and practices of the ADP operation; and

- o prepare reports to identify problems and proposed changes.

-- develop programming specifications for subsystems of embedded computer applications or special purpose computers. They study characteristics such as --

- o equipment configurations;

- o interaction of various subsystems (e.g., navigation, tactical, ordnance, acoustic sensor, and communications);

- o timing constraints; and

- o proposed human/machine interactions.

They provide recommendations to project leaders on system interrelationships that must be considered in producing the output desired (e.g., pilot information or control signals to ordnance). They --

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- o design subsystem information flow;

- o develop processing logic;

- o specify data to be extracted for performance tests; and

- o oversee implementation of programming specifications by monitoring program design, coding, and debugging performed by contractors.

-- serve as a systems monitor or operations trouble-shooter when this involves devising recovery plans for system failure situations. The plans include developing and/or using utility programs to --

- o isolate causes of problems between hardware, system software, and applications programs;

- o enhance the ability to detect damaged or lost files;

- o optimize disk management;

- o measure system performance;

- o control system security; and/or

- o extend operating system capabilities to support local requirements.

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-- In case of failures in agency standard systems, they --

- o make "quick fixes" in higher level language and/or job control language to --

- o restore operations;

- o analyze problems;

- o develop recommendations; and

- o collaborate with design center personnel in effecting needed changes.

- assist end users in one or several subject matter fields in deciding which processes to automate; how to select equipment and software; how best to use available technology; and whether and how to network.

They --

- o review and select equipment and software;

- o assist in set-up, test, and training for subject-matter specialists and support personnel;

- o provide for passwords or other security controls, data base development and management, and the ability to expand systems;

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- o review, test, and select from commercially available software or assist end users with selections;

- o resolve equipment and software compatibility questions; and

- o resolve questions concerning telecommunications protocols, modems, front end processor/controller, and other interface questions.

- develop operating specifications for remote teleprocessing or telecommunications equipment and services to transmit and receive data between computers and between computers and terminal stations. They consider conditions such as --

- o compatibility of equipment and software in terms of the nature of signals passed between stations;

- o communication protocols;

- o the use of modems and telecommunications processors;

- o operating characteristics; and

- o signal speed between work stations.

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They --

- o identify operating requirements and characteristics;
  - o define specifications for quality of operations in terms of signal quality, circuit speed, reliability, and compatibility among stations and systems;
  - o coordinate requirements with telecommunications specialists who acquire circuits;
  - o assure that connectivity and compatibility requirements are satisfied; and
  - o monitor the quality of data transmission and services provided by vendors.
- design, test, or evaluate software to assure that access to computer applications, operating systems, and other stored programs and data is limited to those personnel authorized for such access.

They --

- o evaluate the effectiveness of systems, devices, procedures, and methods used to safeguard classified, privacy, and other sensitive data in computer accessible media;

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- o perform security inspections and prepare reports which include findings and recommendations for correction of deficiencies; and
  - o review or design system software routines to provide an audit trail of activity against sensitive data files or insure that access to data through remote terminals is properly controlled.
- design databases.

They --

- o develop and create data dictionaries; and
- o support backup and recovery through data base management systems.

In support of the data base systems, computer specialists --

- o design distributed database architectures

o design, maintain, update, analyze and monitor data integrity and security of computer data bases; and

o ensure that the data bases support user programs.

### **Level 1-8 - 1550 Points -**

Employees at this level use, in addition to level 1-7 knowledge, mastery of a specialty area (e.g., applications system design, data base management, computer equipment analysis, system software design), or comprehensive knowledge of Federal ADP policy. National policy is as promulgated by Congress, the Office of Management and Budget, the National Institute of Standards and Technology, and the General Services Administration. The employee functions as a technical authority in either a specialty area or as a general data processing expert covering a wide range of technology and applications.

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This knowledge is used in performing a key role in very difficult assignments such as planning advanced system projects or leading task forces for resolving critical problems in existing systems which require innovative solutions in many aspects of the project. Also characteristic of positions at this level are duties such as advising top ADP and user management on new developments and advanced techniques in the specialty area; planning, organizing, and directing studies to develop long range (e.g., 5 to 10 year) ADP forecasts and recommendations; evaluating overall plans for major ADP projects; and/ or coordinating development of ADP standards, guidelines, or policy.

Illustrations: At this level, computer specialists --

-- serve as the authority in the area of mini/micro-computers, terminals, and equipment/programming interfaces of teleprocessing networks. They lead studies affecting broad areas of future operations such as the feasibility of using mini or micro-computers, networking, and distributed data bases at various sites throughout the country rather than replacing existing central computers with larger capacity equipment.

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They --

o advise system planners on the latest developments and projections in the specialty field;

o develop applicable equipment standards, specifications, and guides; and

o head agency committees concerned with equipment acquisition.

-- serve as the staff specialist responsible for analyzing, developing, and recommending the establishment of standards concerning language protocols, system documentation, program testing, and applications programming techniques to be used throughout the agency. They --

- o coordinate the efforts of ad hoc groups working on special procedures development projects;

- o study long range agency needs and trends; and

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- o evaluate technical developments with a view to enhancing programmer productivity and improving program reliability and portability throughout the agency.

-- develop agency directives to implement congressional and executive policy actions. In conjunction with staff specialists in budget and logistics functions, they --

- o develop inter- and intra-agency ADP resource allocation plans;

- o serve as ADP experts on interagency or national committees, boards, and working groups concerned with implementing computer state- of-the-art advancements; and

- o evaluate proposals for large scale ADP systems in the agency.

-- serve as team leaders for advanced system software/ hardware project efforts. They --

- o direct development of overall plans, criteria, and programming specifications;

- o coordinate team efforts in accomplishing the work;

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- o integrate efforts with other projects underway; and

- o present briefings and recommendations concerning long range objectives to top ADP management.

In some assignments involving precedent setting contractor developed software systems, they --

- o monitor and evaluate contractor policies, practices, procedures, techniques, methods, and management controls affecting software development;

- o evaluate contractor procedures for analysis, design, development, test, and support of software systems;

- o participate in the design and development stages of software developed under contract; and
- o set criteria for and lead evaluations of software products.

-- administer major segments of diverse information resource management programs for organizational units engaged in widely dispersed and diversified subject-matter activities.

They --

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- o develop and direct information resource management requirements in shared processing environments for functionally distinct groups within the organization;

- o plan, prepare, and implement guidelines applicable to a variety of locally supported hardware and software for an integrated distributed processing data base; and

- o play a key role in formulating policies and in developing and implementing strategies and management guidelines for distributed processing systems.

## **FACTOR 2, SUPERVISORY CONTROLS**

### **Level 2-3 - 275 Points -**

The supervisor defines the employee's scope of responsibilities and the objectives, priorities, and deadlines. The employee is provided assistance with unusual situations which do not have clear precedents.

The employee plans and carries out the successive steps involved and handles problems and deviations in accordance with agency standards, previous training, established practices, or system controls as appropriate in the application or specialty area. Projects typically require the employee to do some preliminary investigation to ascertain interrelationships that may affect the plan of attack.

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Work is reviewed for technical aspects such as efficiency of the program written in terms of machine time used, whether documentation complies with agency guidelines, or whether equipment specifications adequately set forth both ADP and procurement needs. Techniques used by the employee during the course of the assignment usually are not reviewed in detail.



**Level 2-4 - 450 Points -**

The supervisor sets the overall objectives and, in consultation with the employee, determines timeframes and possible shifts in staff or other resources required.

The employee, having developed expertise in the assignment, independently plans and carries out projects and analyses of the organization's requirements; interprets policies, procedures, and regulations in conformance with established mission objectives; integrates and coordinates the work of others as necessary; and resolves most conflicts that arise. The employee informs the supervisor about progress, potentially controversial matters, or far-reaching implications.

Completed work is reviewed from an overall standpoint in terms of feasibility, compatibility with other work, or effectiveness in meeting requirements or achieving expected results.

**Level 2-5 - 650 Points -**

The supervisor provides administrative direction with assignments in terms of broadly defined missions or functions.

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Within these broad areas of direction the employee has responsibility for planning, designing, and carrying out studies or projects, and for coordinating, as a peer, with experts both within and outside the organization. In performing the work, the employee makes extensive unreviewed technical judgments concerning the interpretation and implementation of existing data processing policy for the assigned specialty area. The employee decides which analytical and technical decisions lead to, or form the basis for, major program policy and operational decisions by top management. The employee is regarded as the leading technical authority for the employing organization in a data processing specialization or over a wide range of interrelated computer systems. The supervisor usually accepts the employee's recommendations without change.

Results of the work are considered technically authoritative and are normally accepted without significant change. Review concerns matters such as fulfillment of program objectives, effect of advice on the overall projects, or contributions to the advancement of technology. Recommendations for new projects and alteration of objectives are usually evaluated for such considerations as availability of resources, broad goals, or national priorities.

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**FACTOR 3, GUIDELINES**

**Level 3-3 - 275 Points -**

Handbooks, manuals, models, and plans are available but are not completely applicable or gaps exist in significant areas, e.g., in the documentation of existing systems being analyzed. These include, in addition to data processing and information resources management directives, various Federal procurement guides, including the Federal Information Resources Management Regulations.

The employee is required to adapt guides and precedents for application to the assigned project or gather considerable information to supplement gaps or lack of specificity to particular problems. Judgment is required in relating precedent approaches to specific situations, such as in determining the kind and amount of data needed for testing a system modification. Established guidelines often must be interpreted, as in the case of advising contractor personnel on the application of agency policy and regulations.

**Level 3-4 - 450 Points -**

Policies and precedents provide guidance which is general in nature with little specificity regarding the approach to be followed in accomplishing the work. Typically, the primary constraints are those imposed by the need for compatibility with existing systems or processes.

Performance of the assigned studies, design projects, equipment, or system software evaluations usually requires deviating from traditional methods or researching trends and patterns to develop improved methods or formulate criteria. The employee uses initiative and resourcefulness in researching and implementing state-of-the-art techniques and technologies in order to develop new and improved methods to cope with particular projects. Some employees develop local implementing instructions based on guidance developed at higher levels when this involves a number of issues. The employee exercises considerable judgment in relating technical developments or requirements to the work of specific activities or projects. At this level the employee demonstrates initiative and resourcefulness in assigned projects that encompass:

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- unprecedented design efforts;
- integrating the work of others as a team or project leader; or
- predicting future environments or the impact on future processing.

**Level 3-5 - 650 Points -**

Guidelines exist in the form of general agency policy, legislation, broadly stated technical objectives, or comparable guidance requiring extensive interpretation and definition. Typically, the major constraints are those imposed by the state-of-the-art computer technology.

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Judgment is required in areas such as developing ways to obtain data on and evaluate the significance of technological advances in a specialty area. The employee must interpret conflicting legislation and/or overall objectives, isolate areas that need development or study, and devise and plan projects to accomplish this. The employee is generally recognized throughout the agency as an expert in a specialty area.

**FACTOR 4, COMPLEXITY****Level 4-3 - 150 Points -**

Assignments consist of various tasks or duties involving different methods or procedures. Typically, concern is with one or two of the stages in an automation project (e.g., program design and module development) or a portion of a specialty area (e.g., equipment utilization). Except in the case of small, routine projects, the assignments usually constitute a segment of a project for which a higher grade employee is responsible.

Decisions regarding methods to be used depend on the nature of the data involved. Normally the employee must analyze plans to discern deviations or other situations that have a bearing on the choice among established techniques for carrying out the assignment.

Accomplishing the assignment involves ascertaining and analyzing interrelationships, e.g., the potential effect of program changes on related programs in the system.

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**Level 4-4 - 225 Points -**

Assignments consist of projects, studies, or evaluations characterized by the need for substantial problem analysis. Typically, concern is with (a) several of the stages in an automation project, or (b) project assignments in a specialty area that require a variety of techniques and methods to evaluate alternatives.

Deciding what has to be done typically involves assessing situations complicated by conflicting or insufficient data which must be analyzed to determine the applicability of established methods. Different technical approaches often must be tested and projections

made. Development of project controls normally is required to integrate various phases of the project. Consideration must be given to probable areas of future change in systems design, equipment layout, or comparable aspects that will facilitate subsequent modifications.

The work requires consideration of considerable data. The level of difficulty is typified by developing programming specifications for (a) major modifications to existing systems, or (b) new systems where precedents exist at the same general scale of operation as the new systems. Computer equipment or system software evaluation and modification at this level primarily concern items available from vendors already in use in other Government or private ADP operations.

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#### **Level 4-5 - 325 Points -**

Assignments consist of various projects or studies characterized by the need for significant departures from established practice. They typically involve (a) a number of stages in an automation project to include studies preliminary to the decision to automate, or (b) an unusual depth of analysis of system software, computer equipment, or a similar broad specialty area. This depth of analysis typically is evidenced by assignments which involve features such as: a) responsibility for integrating facets of the work performed by others; b) concern with fields of rapidly evolving technology; and c) problems of a type that have been resistant to solutions in the past.

Decisions regarding what needs to be done are complicated by the novel or obscure nature of the problems and/or special requirements for organization and coordination. (An integrated payroll, personnel, and accounting system would, for example, present special requirements for organization and coordination.) Usually there are conflicting requirements, the problems are poorly defined, or they require projections based on variable data or technological developments. Developments in system software or equipment technology make project designs obsolete and require major reconsideration of many or all aspects of the project, and impact on related systems or project funding.

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Technical difficulty is exceptional, such as, (1) developing major items of system software (e.g., assemblers, compilers, multiprogramming routines, files management routines) where numerous conditions, options, and machine characteristics must be considered, or (2) developing specifications for a major segment of a new application system where the work typically is unprecedented in nature or scope.

#### **Level 4-6 - 450 Points -**

The work involves broad functions and processes in automated data processing. Studies performed are primarily of an exploratory nature, to define issues and problems in areas

where useful precedents do not exist and establishment of new concepts and approaches is required. Assignments are characterized by breadth and intensity of effort and involve several phases being pursued concurrently or sequentially with the support of others within or outside the organization.

Decisions regarding what is to be done involve largely undefined issues and elements, requiring extensive probing and analysis to determine the nature and scope of the problems.

Actions taken by the employee require continuing efforts to establish concepts, theories, or programs, or to resolve previously unyielding problems.

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## **FACTOR 5, SCOPE AND EFFECT**

### **Level 5-3 - 150 Points -**

The work involves resolving a variety of conventional problems, questions, or situations such as typically is the case where responsibility has been assigned for maintenance of a set of programs. Established practices and techniques are used.

The work affects the adequacy of such activities as field investigations, internal operations, or research conclusions. This level includes responsibility for projects that, although affecting activities or individuals throughout the agency, are primarily to facilitate a local operation. For example, developing or modifying an automated records keeping system at an agency training center responsible for maintaining training records on agency employees located throughout the country.

### **Level 5-4 - 225 Points -**

The work involves investigating and analyzing a variety of unusual problems, questions, or conditions associated with a particular application or specialty area; formulating projects or studies such as those to substantially alter major systems; or establishing criteria in an assigned application or specialty area, e.g., developing programming or procurement specifications.

The work affects a wide range of agency activities, activities of non-Government organizations, or functions of other agencies. Assignments at this level typically are concerned with (a) the agency's single centralized ADP operation which is linked to terminals at numerous agency sites throughout the country, or (b) standard systems to be used subsequently on numerous equipment units or at numerous installation level ADP operations in the agency.

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**Level 5-5 - 325 Points -**

The work at this level involves such things as:

- isolating and defining issues or conditions, as typically is the case where a number of project efforts or studies must be coordinated and integrated;
- resolving critical problems in agencywide systems; or
- developing new approaches and techniques for use by others.

Usually, the employee at this level does not have a regular application area assignment but rather serves as a consultant in a specialty area (e.g., system software, applications programming techniques, programming standards) or as a project coordinator in carrying out one-of-a-kind efforts.

Advice, guidance, or results of the work affect development of major aspects of administrative or scientific efforts throughout an agency. Examples at this level include (a) determining the desirability of replacing an agency's centralized computer facility with a network of mini or micro-computers, or (b) developing guidance for ADP security techniques to be used throughout an organization. Such work significantly affects the work of other computer experts throughout the agency and often in other agencies.

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**Level 5-6 - 450 Points -**

The work involves planning, developing, and carrying out vital administrative or scientific ADP projects.

The projects are central to the mission of the agency and typically are of national or international impact. Work on policy matters normally involves establishing the agency's position on broad issues. Typical of work at this level is that of the project leader of a group which includes key user representatives from other agencies or departments oriented to long term efforts on advanced systems that will establish precedent in the affected area and influence major functions of other agencies and non-Government organizations.

**FACTOR 6, PERSONAL CONTACTS AND  
FACTOR 7, PURPOSE OF CONTACTS**

Match the level of regular and recurring personal contacts with the directly related purpose of the contacts and credit the appropriate point value using the chart below.

**Persons Contacted**

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1. Contacts are with co-workers in the immediate organization and in related or support units.
2. Contacts include those with employees in the agency but outside the immediate organization, such as user representatives or field personnel engaged in different, i.e., non-ADP, work.
3. Contacts, in addition to those within the agency, are with vendor representatives, computer personnel of other agencies, representatives of professional associations, and the like. This level may also include contacts with the head of the employing agency or program officials several managerial levels above the employee when such contacts occur on an ad hoc or other irregular basis.
4. Contacts are with high-ranking officials from outside the employing agency at national or international levels in highly unstructured settings. This includes high-ranking officials of Federal, State, major municipal, or foreign governments, or of comparable private sector organizations, or scientific groups and organizations.

**Purpose of Contacts**

- a. The purpose of contacts is to obtain or exchange factual information.
- b. The purpose of contacts is to coordinate work efforts, solve problems, or to provide advice to managers on noncontroversial organization or program related issues and concerns.
- c. The purpose of contacts is to (a) influence others to utilize particular technical methods and procedures, or (b) to persuade others to cooperate in meeting objectives when (in either case) there are problems in securing cooperation.
- d. The purpose of contacts is to justify, defend, negotiate, or settle highly significant matters such as convincing top agency officials or leaders of major interest groups, e.g., a major segment of industry, business, or the scientific community, of the feasibility of controversial ADP systems, approaches, or proposals that effect agency policy, national policy, set precedent, and involve large expenditures of resources.

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**PURPOSE**

		<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>
<b>C O N T A C T S</b>	<b>1</b>	30	60	130*	230*
	<b>2</b>	45	75	145	245
	<b>3</b>	80	110	180	280
	<b>4</b>	130*	160	230	330

*\* These combinations are probably unrealistic.*

**FACTOR 8, PHYSICAL DEMANDS****Level 8-1 - 5 Points -**

The work is sedentary. No special physical demands are required to perform the work.

**FACTOR 9, WORK ENVIRONMENT****Level 9-1 - 5 Points -**

The work is performed in a typical office setting. Special safety precautions are not required.